

Tatoosh Island, Washington Territory, 64, e., 16th.

Cape Mendocino, California, 108, se., 16th.

On the summits of Mount Washington, New Hampshire and Pike's Peak, Colorado, velocities of fifty miles or more were reported on the following dates:

Mount Washington, 2d, 6th to 10th, 14th to 17th, 19th, 20th, 21st, 23d, 27th, to 31st. The maximum velocity, 96, nw., occurred on the 19th.

Pike's Peak, 8th, 15th, 16th, 24th; (maximum velocity, 73, w., on the 15th).

LOCAL STORMS AND TORNADOES.

Alabama.—Mobile: during the afternoon of the 18th the bark "Nannie Bell" dragged anchor and was driven on a sand-bar on the opposite side of the river; no damage resulted.

California.—Red Bluff: the Signal Service observer reports northerly gales on the 6th, which continued during the night. At Red Bluff the velocity of the wind did not exceed thirty-eight miles per hour, but a much higher velocity was attained in the eastern part of the county. At the Champion lumber mills, thirty miles north of this place, a large number of trees, varying in size from six inches to four feet in diameter, were blown down. This storm is considered to have been one of the severest ever experienced in this part of the state.

San Francisco: a violent storm prevailed at this place on the 7th, the wind reaching a velocity of forty-five miles per hour between 6 and 7 a. m. The greatest damage was done along the water front; the breakwater at the foot of Green street was completely washed away, and two sections of the sea wall were crushed in. Several vessels in the harbor broke from their moorings and were blown ashore, while many others sustained damage.

Colorado.—Colorado Springs: an unusually severe storm prevailed during the night of the 18-19th; trees and telegraph lines were prostrated.

Louisiana.—New Orleans, 28th: a southeasterly gale began at 11.10 a. m. and ended at 2.20 p. m., the wind reaching a velocity of twenty-eight miles per hour at 1.30 p. m.; at 11.50 p. m. the wind again reached a velocity of twenty-five miles per hour, and continued high until 2.25 a. m. on the 29th.

Shreveport: a heavy rain and thunder-storm from the south-east occurred during the night of the 29-30th, the wind attaining a velocity of twenty-six miles per hour from 4.45 to 5.00 a. m. Reports from the surrounding country state that telegraph lines were prostrated, and that the heavy rains caused the streams to rise rapidly; washouts occurred on the railroads.

New Jersey.—Trenton: several buildings at this place were badly damaged and many telephone wires were broken down by the storm of the night of the 6-7th.

New York.—New York City: a severe snow and rain squall occurred on the afternoon of the 9th, the wind reaching a velocity of forty miles per hour at 2.57 p. m.

Ohio.—Columbus: a high northwesterly wind began at 8.21 a. m.; a wind velocity of thirty miles per hour occurred at 9.15 a. m.

Pennsylvania.—Pittsburg: a high westerly wind prevailed for a short time between 1 and 2 p. m. on the 9th; a velocity of thirty-six miles per hour was recorded.

Erie: high southwest to northwest winds prevailed from 9.15 a. m. to 3.13 p. m. on the 9th; a velocity of thirty-five miles per hour from the northwest occurred at 12.14 p. m.

Chester: at 9 p. m. on the 6th a violent storm passed over this place, moving from southwest to northeast; about twenty houses in this city were unroofed and much other damage was done.

Easton: a storm of unusual violence occurred during the evening of the 6th, being most violent at about 10 p. m.; the rainfall was very heavy, and caused streams in this vicinity to rise rapidly.

Virginia.—Fort Myer: high wind prevailed from 1.30 to 6.15 p. m. on the 9th, reaching its height at 2.55, when a

velocity of forty-two miles per hour was recorded. A wind velocity of thirty-eight miles occurred on the 23d.

Cape Henry: at 3.43 p. m. on the 9th the wind suddenly shifted from southwest to northwest and increased in force from sixteen to fifty-four miles per hour.

Reports from the vicinity of Urbana, Middlesex county, on the Rappahannock river, state that a violent storm occurred on the 9th, during which about twenty-five oyster boats were capsized and nearly all the boatmen were drowned.

Washington Territory.—Fort Canby: the Signal Service observer reports that a southeasterly gale occurred during the night of the 2-3d. During the following day the sea was unusually rough and the tides very high. The steamship "Wilamette," in attempting to enter the harbor, sustained damage; a heavy sea swept over the vessel washing two men overboard and clearing the decks of everything. On the 16th a high wind began at 6.30 p. m., and between 7 and 8 p. m. the wind blew at the rate of one hundred and four miles per hour. Considering the violence of this storm but little damage was done. Violent gales also prevailed at Fort Canby during the 23d and 24th. During the night of the 23-24th, the ship "Chesborough," lying at Sand Island, dragged anchor for a distance of two miles against a strong flood tide, and grounded on the extreme northeast end of Clatsop Spit, about four miles from station.

Port Angeles: from 5 to 5.35 p. m. on the 5th, a violent hailstorm, accompanied by thunder and lightning, passed over this station. The hail stones were very small but fell with great force and in sufficient quantity to cover the ground to a depth of about three fourths of an inch.

The following reports of tornadoes which occurred during December have been received:

Plum Branch, Edgefield county, South Carolina: a tornado occurred in the southwestern part of Clarendon county, in this state, on the 22d. The tornado cloud was funnel-shaped and moved northeastward, destroying everything in its path, which was about fifteen miles in length and 1,500 feet in width. Several persons were injured; a number of horses and cattle were killed, and several buildings were destroyed.

Atlanta, Georgia: a tornado occurred in Oconee and Oglethorpe counties at 2.00 p. m. on the 22d. The width of the tornado's path was two hundred and twenty-five feet. Several buildings and much timber were destroyed.

On the evening of the 24th a tornado passed through Berrien county; the cloud was of the usual funnel-shape, and it descended to the earth but for a moment, but in that time it destroyed all the buildings on plantations and scattered the farm produce.

Pine Ridge, Twiggs county, Georgia: a tornado occurred six miles southwest of Macon, in this state, at 11 a. m. on the 22d. It is described as "swooping down for a distance of three hundred yards and then ascending." Only one plantation was struck by the tornado, but all the buildings thereon were destroyed; no loss of life occurred.

NAVIGATION.

STAGE OF WATER IN RIVERS.

At Shreveport, Louisiana, the Red river reached a navigable stage, six feet and six inches on the 16th; on the 29th a sudden and unusual rise occurred, the river having risen five feet and three inches in twenty-four hours.

Navigation on the Cumberland river at Nashville, Tennessee, was resumed for the season on the 16th. Steamboat men at this place state that the date of the opening of navigation for the present season is one of the latest known.

The Mississippi river was frozen throughout the month at Saint Paul, Minnesota; at La Crosse, Wisconsin, it froze on the 17th; at Dubuque and Davenport on the 18th, and at Keokuk on the 21st; at these stations it remained frozen after the dates named.

The Missouri river froze at Yankton, Dakota, on the 15th;

at Omaha, Nebraska, on the 17th; and at Leavenworth, Kansas, on the 18th.

The Arkansas river, at Little Rock, when at its highest stage on the 31st, was one inch above the danger line.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest depths for December, 1884, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, December, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>	<i>Ft. In.</i>		<i>Ft. In.</i>		<i>Ft. In.</i>	<i>Ft. In.</i>
Shreveport, Louisiana.....	29 9	31	20 9	1	4 2	16 7
<i>Arkansas:</i>						
Little Rock, Arkansas.....	23 0	31	23 1	7, 8	5 3	17 10
Fort Smith, Arkansas.....	15 0	31	10 7	27	3 5	14 0
<i>Missouri:</i>						
Yankton, Dakota.....	24 0	1 to 4	6 0	13, 14	5 9	0 3
Omaha, Nebraska.....	18 0	8	5 11	10	4 0	1 11
Leavenworth, Kansas.....	20 0	8, 9, 10	6 6	15	4 8	1 10
<i>Mississippi:</i>						
Saint Paul, Minnesota.....	14 0					
La Crosse, Wisconsin.....	24 0	8, 9	5 9	16	3 10	1 11
Dubuque, Iowa.....	15 0	13, 14	5 8	1	3 6	2 2
Davenport, Iowa.....	10 0	15	4 10	3	1 11	2 11
Keokuk, Iowa.....	14 0	31	10 6	4	2 4	8 2
Saint Louis, Missouri.....	32 0	31	16 6	20	3 9	12 9
Cairo, Illinois.....	40 0	31	24 4	9, 10	7 4	17 0
Memphis, Tennessee.....	34 0	31	13 5	11, 12	4 1	9 4
Vicksburg, Mississippi.....	41 0	11	15 11	15	4 10	11 1
New Orleans, Louisiana.....	—3 0	31	—10 7	3	—14 0	3 5
<i>Ohio:</i>						
Pittsburg, Pennsylvania.....	22 0	23	12 11	5	2 1	10 10
Cincinnati, Ohio.....	50 0	28	20 11	1	4 5	16 6
Louisville, Kentucky.....	25 0	30	9 5	1, 2, 3	3 3	6 2
<i>Cumberland:</i>						
Nashville, Tennessee.....	40 0	26	14 10	1	0 8	14 2
<i>Tennessee:</i>						
Chattanooga, Tennessee.....	33 0	23	12 7	5, 6, 7	1 1	11 6
Knoxville, Tennessee.....	24 0	24	4 5	5	0 4	4 1
<i>Monongahela:</i>						
Pittsburg, Pennsylvania.....	29 0	23	12 11	5	2 1	10 10
<i>Sacramento:</i>						
Augusta, Georgia.....	32 0	16	20 6	4, 5	5 3	15 3
<i>Willamette:</i>						
Portland, Oregon.....	22 0	22	9 0	13, 14, 15	1 2	7 10
<i>Sacramento:</i>						
Red Bluff, California.....	26 0	26	16 3	5 to 17	0 10	15 5
Sacramento, California.....	27 0	27	24 7	8 to 17	7 6	17 1
<i>Mobile:</i>						
Mobile, Alabama.....	5 0	17	2	19	13 0	4 2
<i>Colorado:</i>						
Yuma, Arizona.....	30 0	30	15 9	2	13 5	2 4

§ Below bench mark.

† Below high-water mark of 1874 and 1883.

• Observations interrupted by ice. ‡ Frozen throughout month.

ICE IN RIVERS AND HARBORS.

Saint Croix river.—Calais, Maine: the river closed to navigation on the 20th.

Kennebec river.—Gardiner, Kennebec county, Maine: river closed on the 14th, having been open 250 days.

Penobscot river.—Bangor, Maine: "anchor ice" along the shores on the 2d; on the 7th the ice was broken up and carried out by the tides; during the night of 18–19th the river froze over.

Connecticut river and New Haven harbor.—New Haven, Connecticut: the harbor was partially frozen on the 20th; the river froze over on the same date.

Hudson river.—Menand Station, (near Albany) New York: navigation closed for the season on the 19th; ice started in the river on the 31st.

Albany, New York: floating ice, 15th to 18th; river frozen over on the 19th; navigation on the canals was closed on the 1st.

Troy, New York; pedestrians crossed the river on the ice on the 20th.

Rondout, New York: the cold weather during the night of the 19–20th closed the river at this point, ice five inches thick having formed. The ferry-boats plying between this place and Rhinebeck continued to make trips with difficulty.

Poughkeepsie, New York: river filled with floating ice on the 25th.

Chincoteague bay.—Chincoteague, Virginia: the bay froze over on the 19th.

Little Egg harbor.—Little Egg harbor, New Jersey: much ice in the sound and bay on the 20th.

Potomac river.—Washington, District of Columbia: the river was partly frozen on the 19th; the ice in the channel was kept broken by steamers.

Fort Myer, Virginia: river froze over on the 19th.

Henderson bay.—Madison Barracks, New York: bay froze over on the 19th; ice broke up during the night of the 22d; bay froze over again on the 24th; ice broke up during the night of the 31st.

Oswego river.—Oswego, New York: river froze over on the 30th. The steam barge "Saxon" left port on the 13th, being the last departure of the season.

Niagara river.—Buffalo, New York: the river was frozen from the 19th to 29th; the ice broke up on the latter date.

Lake Erie.—Cleveland, Ohio: the lake was frozen at this place on the 23d.

Erie, Pennsylvania: the propeller "Delaware," which arrived on the 1st, was the last boat of the season to enter this port.

Buffalo, New York: navigation closed for the season on the 6th.

Cuyahoga river.—Cleveland, Ohio: the river froze over on the 1st.

Sandusky bay.—Sandusky, Ohio: the first ice in the bay was observed on the 1st; on the 16th, the bay froze over.

Susquehanna river.—Port Deposit, Maryland, 19th: the recent cold weather has filled the river with ice; on the afternoon of this date, ice became stationary, and the river was packed from shore to shore. Several boats are ice-bound at this point.

Maumee river.—Toledo, Ohio: the river was covered with thin ice on the 1st; navigation was closed for the season on the 15th; on the 20th, the ice was four inches thick; the ice began to break up on the 30th.

Thunder bay and Thunder bay river.—Alpena, Michigan: ice in river and bay on the 13th; both bay and river partly frozen on the 15th, and entirely frozen on the 17th.

Straits of Mackinac.—Mackinaw City, Michigan: during the night of the 16–17th, the strait froze to a distance of five hundred yards from the shore.

Little Bay De Noquet.—Escanaba, Michigan: the tug "A. Booth," left for Chicago on the 9th, being the last departure of the season; the bay was partly frozen on the 13th, and entirely frozen on the 14th.

Lake Michigan.—Milwaukee, Wisconsin: the propeller "Rochester" arrived on the 9th, being the last boat of the season; ice formed along the shores of the lake on the 13th.

Chicago, Illinois: lake frozen on the 17th.

Duluth bay.—Duluth, Minnesota: the propeller "N. K. Fairbanks" arrived on the 1st, being the last boat of the season; the bay was frozen along the docks on the 2d; considerable floating ice on the 4th; ice formed along the shores of the lake on the 16th; the ice began to break up and move out on the 28th; on the 30th, the north side of the lake was clear of ice.

Scioto river.—Columbus, Ohio: the river froze over on the 9th.

Detroit river.—Detroit, Michigan: floating ice on the 1st and 19th; river was nearly free of ice on 28th and 29th.

Rock river.—Rockford, Winnebago county, Illinois: river clear of ice on the 7th; light ice floating on 10th; river closed again on 13th.

Grand river.—Grand Haven, Michigan: first ice in river on 16th; river frozen on 18th.

Lansing, Michigan: on the 15th, for the second time this season, the river froze over; ice broke up again on the 31st.

Saint Joseph river.—Mottville, Michigan: the rains from the 27th to 30th broke up the ice in the river at this place.

Saint Clair river.—Port Huron, Michigan: heavy floating ice on the 25th.

Black river.—Port Huron, Michigan: river froze over on the 18th.

Des Moines river.—Des Moines, Iowa: river froze during the night of the 15–16th.

Maquoketa river.—Monticello, Jones county, Iowa; ice went out of the river on the 5th, river closed again on the 14th, on the 20th the ice was fourteen inches thick.

Arkansas river.—West Las Animas, Colorado: the river froze over on the 24th.

Fort Smith, Arkansas: ice formed in the river on the 18th; floating ice observed on 19th, 20th, 24th, 25th, 28th, 29th.

Ohio river.—Pittsburg, Pennsylvania: floating ice on the 4th, 5th, and from the 18th to 31st.

Leetsdale, Allegheny county, Pennsylvania: floating ice in river nearly the entire month.

Portsmouth, Scioto county, Ohio: river full of floating ice from 21st to 31st.

Cincinnati, Ohio: floating from 23d to 31st; navigation suspended from 25th to 29th; river clear of ice on 31st.

Louisville, Kentucky: floating ice from 19th to 31st; on the 21st navigation was suspended at all points from Pittsburg to Cairo; navigation was resumed on the 29th.

Laconia, Indiana: floating ice on the 23d.

Mississippi river.—Saint Paul, Minnesota: the river remained frozen throughout the month.

La Crosse, Wisconsin: floating ice on 3d; river froze on 17th.

Dubuque, Iowa: floating ice from 1st to 4th, 6th, 7th, 9th to 17th; river frozen from 18th to 31st.

Davenport, Iowa: floating ice on 1st, 2d, 7th to 17th; river closed on 18th; on the 20th pedestrians crossed on the ice, and on the 22d teams crossed. The ferryboats made their last trips on the 15th.

Burlington, Iowa: floating ice on 11th; river closed during the night of 18–19th.

Keokuk, Iowa: floating ice on 1st; on the 5th the river was free of ice, and the steamers "Plough Boy" and "Rescue" made regular trips. Navigation was again suspended on the 12th on account of drift ice; on the 20th an ice-dam formed; the river froze over on the 21st.

Cairo, Illinois: large quantities of floating ice on the 19th, closing navigation to the northward; the heavy drift ice on the 26th caused considerable damage; two boats were sunk, one of which contained 6,000 bushels of coal.

Memphis, Tennessee: ice formed along the shores on the 23d; floating ice from 23d to 27th; on the latter date navigation was suspended on account of ice, which was reported in the Mississippi, as far southward as the mouth of the Arkansas river, two hundred and fifteen miles from Memphis.

Missouri river.—Fort Buford, Dakota, river closed on 14th.

Yankton, Dakota: river froze on the 15th.

Omaha, Nebraska: river froze during the morning of the 17th.

Fort Sully, Dakota: floating ice on 2d, 3d; river clear on 4th; floating ice on 10th and 11th; river closed during night of 16–17th. No boats ran north of Yankton after November 27th.

Fort Bennett, Dakota: river froze on 17th.

Leavenworth, Kansas: ice-dam formed on 16th; river closed on 18th.

Miscellaneous.—Baltimore, Maryland, 27th: ice, in sufficient quantities to interrupt navigation, is reported from the smaller tributaries to the bay.

Delaware Breakwater, Delaware, 19th: ice six inches thick.

Fort Scott, Kansas: at close of the month ice was ten inches thick.

FLOODS.

Arkansas.—Little Rock, 31st: reports from points along the Memphis and Little Rock railroad state that in many places along this road the country is covered with water, and in some instances it reached the level of the road bed. Reports from along the line of the Iron Mountain road stated that similar conditions existed in the country through which that road passes. A train from Arkansas City, due at Little Rock at 8.46 p. m. on the 29th, did not arrive until 7.30 on the

following morning, and the passengers reported that in some places the whole country was under water; from Pine Bluff to Arkansas City all of the large plantations were inundated.

California.—Sacramento: the Sacramento river on the 27th, reached a height of 24 feet 7 inches, or within 1 foot 11 inches of high water mark. The American river began to fall on the 26th, after having overflowed many of the hop-fields in the vicinity of Brighton. Reports from Marysville, Yuba county, on the 26th, stated that the water in Feather river had reached the top of some of the levees in Sutler county, about sixteen miles below Marysville.

It is reported from Nevada City, Nevada county, that in that vicinity the Yuba river reached the highest point on the 25th that has been known since 1862.

At Chico, Butte county, the Butte creek levee gave way on the 25th, and a large volume of water poured through the breaks.

At Linden, San Joaquin county, the water was from three to four feet deep in the town, and many small bridges in the vicinity were washed away.

Stockton, San Joaquin county: on the morning of the 25th, the Moss tract of land, west of this place, was flooded, causing a loss of from \$40,000 to \$50,000.

On the 26th, the mountain streams in Calaveras and Tuolumne counties, were much swollen, endangering the levees and causing suspension of travel.

Merced, Merced county: on the 26th, the low grounds in this vicinity were flooded and the country to the west of this place was under water for miles. The approaches of the bridge over Merced river were endangered.

In the vicinity of Plainsburg, the water reached the highest point known for several years.

Michigan.—Ionia, Ionia county: the Grand river at this place overflowed on the 31st.

HIGH TIDES.

Eastport, Maine, 3d.

New River Inlet, North Carolina, 6th.

Fort Canby, Washington Territory, 3d.

LOW TIDES.

Baltimore, Maryland, 19th.

New River Inlet, North Carolina, 23d, 24th.

Indianola, Texas, 1st, 2d, 7th, 13th, 14th, 18th, 19th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for December, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 79.73 per cent. The percentages for the four elements are: Weather, 85.36; direction of the wind, 76.99; temperature, 74.95; barometer, 86.48 per cent. By geographical districts, they are: For New England, 81.53; middle Atlantic states, 85.23; south Atlantic states, 82.76; eastern Gulf states, 81.41; western Gulf states, 80.63; lower lake region, 75.73; upper lake region, 78.90; Ohio valley and Tennessee, 78.89; upper Mississippi valley, 77.68; Missouri valley, 75.26; north Pacific coast region, 78.23; middle Pacific coast region, 79.84; south Pacific coast region, 76.61. There were three omissions to predict out of 3,066, or 0.10 per cent. Of the 3,063 predictions that have been made, one hundred and seventy-six, or 5.75 per cent., are considered to have entirely failed; one hundred and seventy-four, or 5.68 per cent., were one-fourth verified; three hundred and ninety-four, or 12.86 per cent., were one-half verified; four hundred and sixty-nine, or 15.31 per cent., were three-fourths verified; 1,850, or 60.40 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During December, 1884, one hundred and eighty-six cautionary signals were ordered. Of these, one hundred and